

REMARKS

Claims 1-16 are pending with this amendment. Support for new claim 16 can be found in the specification at Table 4.

The obviousness rejections

A. Claims 1, 2, 7, and 10 have been rejected under 35 U.S.C. 103(a) as obvious over U.S. Patent No. 6,478,853 (Hara)

The Examiner contends that Hara discloses a hydrogen permeable foil in an amorphous state comprising a non-crystalline zirconium-nickel alloy composed of zirconium and aluminum with the balance being nickel and unavoidable impurities. Further, according to the Examiner, Hara discloses palladium thin film on both sides of the foil. The Examiner acknowledges that Hara does not disclose a hydrogen permeable foil in an amorphous state comprising the claimed atom %'s of zirconium and aluminum. The Examiner contends that the claims are obvious because discovering optimum or workable ranges is routine in the art.

Applicants respectfully traverse this rejection. Hara discloses three combinations of major components (Zr/Ni, Hf/Ni, Hf/Zr/Ni, Hara, col. 4, ll. 26-30) and a component other than a major component that is preferably 10 mol % or less, and more preferably 5 mol % or less (Hara, col. 4, ll. 26-30). Hara does not disclose or suggest the claimed foil comprising a specific combination of components, and specific atom % ranges for each component, that result in beneficial characteristics such as stability at high temperatures. *See, e.g.*, specification, paras. 9, 11, 18, 24, Tables 1 and 2. The claimed atom % ranges for the components are critical to a foil having high temperature heat resistance and are, thus, not merely the result of routine optimization.

Further, Hara teaches three combinations of major components (see above) and at least five minor components (Cu, Ag, Al, Zn, and Ti, Hara, col. 4, ll. 36-37). It would not have been obvious to one of ordinary skill in the art to arrive at the claimed combination of components, in the claimed ranges, from the vast number of possible combinations disclosed in Hara.

Thus, the prior art does not disclose or suggest the claimed specific combination of components in specific atom %'s that results in a foil having the characteristic of high temperature heat resistance. Accordingly this rejection should be withdrawn.

B. Claims 3, 4, and 8 have been rejected under 35 U.S.C. 103(a) as obvious over U.S. Patent Publication No. 2003/0183080 (Mundschau)

The Examiner contends that Mundschau discloses a hydrogen permeable foil in an amorphous state comprising a non-crystalline zirconium-nickel alloy composed of zirconium and at least one of vanadium and niobium, wherein the balance is nickel and unavoidable impurities. The Examiner acknowledges that Mundschau does not disclose a hydrogen permeable foil in an amorphous state comprising the claimed atom %'s of zirconium and at least one of vanadium and niobium. Further, Mundschau does not disclose the nickel atom % claim limitation of claim 4. As to claim 8, Mundschau does not disclose the nickel and at least one of vanadium and niobium atom % limitations. The Examiner contends that the claims are obvious because discovering optimum or workable ranges is routine in the art.

Applicants respectfully traverse this rejection. Mundschau discloses a crystalline alloy, not an alloy in an amorphous state. An alloy in the amorphous state cannot be produced by simply quenching a crystalline alloy. A teaching relating to a crystalline alloy is not directly applicable to an amorphous alloy because specific attention must be paid to the composition and ratio of components to produce an alloy in the amorphous state.

Further, Mundschau discloses that, for example, V, Nb, Ta, Zr, and/or Pd can be alloyed with one or more of Co, Fe, Rh, Ru, Pt, Mo, W, Ni, Al, or Mg. Mundschau does not specifically disclose the claimed combination of components. The claimed combinations (e.g., of Zr and Nb) have a significant effect on the foil, such as its high-purity gas flow rate. Arriving at such combinations from among the large number of possible combinations disclosed in Mundschau was not obvious nor a matter of routine optimization.

For the reasons stated above, this rejection should be withdrawn.

C. Claims 5, 6, 9, and 11-15 have been rejected under 35 U.S.C. 103(a) as obvious over Mundschau in view of Hara

Mundschau and Hara, as described in the Office Action, are summarized above. Mundschau does not disclose phosphorus. According to the Examiner, Hara teaches that it "was known to substitute a non-crystalline zirconium-nickel alloy composed of zirconium, niobium, and phosphorus." Office Action, p. 6 (emphasis in the original). The Examiner contends that it would have been obvious to include phosphorus in the alloy of Hara in order to prepare the non-crystalline

alloy easily. The Examiner contends that it would have been obvious to arrive at the atom %'s of claims 5, 6, 9, and 11-15 because discovering optimum or workable ranges is routine in the art.

Applicants respectfully traverse this rejection. Mundschau discloses an alloy in which Ni is one of a number of minor components, and Hara does not disclose or suggest any particular atom % of Ni. Thus, there is no teaching or suggestion in the combination of references to arrive at the claimed foil in which the amount of Ni exceeds the amount of Nb or P.

Further, the claimed combinations of Zr, Nb and P have a significant effect on the foil, such as its high-purity gas flow rate. Arriving at such combinations from among the large number of possible combinations disclosed in Mundschau was not a matter of routine optimization. As acknowledged by the Examiner, Hara does not disclose phosphorus. Thus, the combination of references does not disclose or suggest the claimed combination of components or atom %'s.

For the reasons stated above, claims 5, 6, 9, and 11-15 are non-obvious and this rejection should be withdrawn.

Conclusion

In view of the above amendments, applicant believes the pending application is in condition for allowance. If there are any remaining issues that may be addressed by an Examiner's amendment or supplemental response, the applicant respectfully requests that the Examiner contact the undersigned.

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Respectfully submitted,

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